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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,674	06/19/2006	Alberto De Angelis	280875US0XPCT	8278

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EXAMINER	
LEE, REBECCA Y	

ART UNIT	PAPER NUMBER
4181	

NOTIFICATION DATE	DELIVERY MODE
12/11/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/562,674	DE ANGELIS ET AL.	
	Examiner	Art Unit	
	REBECCA LEE	4181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) *5* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/29/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicants' election with traverse of specie I claim 2 in the reply filed 11/14/08 is acknowledged.

Applicant's arguments filed 11/14/08 have been fully considered but they are not persuasive. The species listed do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: lack of unity of invention may be directly evident "a priori," that is, before considering the claims in relation to any prior art, or may only become apparent "a posteriori," that is, after taking the prior art into consideration. In view of applicants' admitted reference (see page 4), it is clear no common feature shared by the two different species. Specie I is drawn to direct reaction between elemental sulfur and Specie II is drawn to a reaction comprises at least two passages with Cl_2 involved. Unity is lacking since Cl_2 is only required by species II, which yields materially different reaction mechanism.

Applicants further argue "Examiner has not shown that an examination of all of the present claims can be made without serious burden placed on the Examiner". It is to be noted that for a 371 case, search burden is not required for the restriction to be proper; the restriction is proper once lack of unity is proved.

The requirement is still deemed proper and is therefore made FINAL.

Claim 5 is withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitations "the hydrochloric acid" and "Cl_2" in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim.

In light of specification, claim 6 should be dependant on claim 5 (non-elected claim) instead of claim 4.

Regarding to claim 7, applicant define Reynolds number as $Re = D_{eq} \cdot \mu_m \cdot \rho/\mu$, where D_{eq} is diameter, μ_m average rate of the fluid, ρ density and μ the kinematic viscosity. It is well known in the art (see evidential document Calculating Friction Loss in PTO-892), the general formula for calculating Reynolds number is $Re = \rho vd/\mu$, where ρ is the density, v the velocity of the fluid, d diameter of the pipe and μ is the absolute (or dynamic) viscosity of the fluid. The kinematic viscosity is calculated by diving dynamic viscosity by the density. That is, the claimed formula violates the definition of Reynolds number. Explanation or correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Estep et al. (US 3920424) in view of Paul (US4773483).

Regarding to claims 1-3, Estep et al. discloses elemental sulfur in molten state (liquid sulfur) from a Claus process (Column 2, lines 43-47) and hydrogen sulfide would react directly to form liquid sulfanes (polysulphides) (see reaction equation in Column 2, lines 55-56).

Estep et al. is silent about injecting the liquid sulfane into geological formation.

Paul teaches injecting liquid sulfanes (polysulfides) into subterranean formations (geological formations) (see title and abstract). Paul does not expressly state it is under room temperature; it is reasonable to assume it is under ambient condition room temperature.

It would be obvious to one of ordinary skill in the art to modify the process taught by Estep et al. by injecting sulfane into geological formations as taught by Paul since there is a need to dispose sulfur presents in natural gases or exhaust gases. Converting sulfur into sulfane as taught by Estep et al. then injecting into geological formation as taught by Paul would provide a solution for the disposal of sulfur

With respect to claim 1, step (b), since the applicants recites “optionally”, i.e., not required by the process; thus, is not taken into consideration for examination purpose.

Estep et al. in view of Paul does not specifically state the process is for disposal of sulfur. However, since the process is obvious over Estep et al. in view of Paul; the purpose of disposal of sulfur is also obvious met.

Regarding to claim 10, Estep et al. discloses the reaction of H_2S and sulfur to form sulfane is a two-way reaction (see reaction equation in Column 2, lines 55-56) and the sulfanes are tended to be decomposed. It would be obvious to one of ordinary skill in the art to add molten sulfur to a concentration corresponding to the solubility limit to shift the reaction to form sulfane and prevent the sulfane to decompose into sulfur.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Estep et al. (US 3920424) in view of Paul (US4773483) to claim 1 above, and further in view of Harbolt et al. (US4966736).

Estep et al. does not explicitly teach the sulfur could come from a surface storage site. However, it is well known in the art that molten sulfur would be conveyed into a storage site for delivery as discloses by Harbolt et al. (Column 1, lines 51-56). It would be obvious to one skilled in the art to use sulfur from a storage site since it is commercially available and easy to access.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Estep et al. (US 3920424) in view of applicants' admission in page 4 as applied to claim 1 above, and further in view of Swanson et al. ("Pipe flow measurements over a wide range of

Reynolds numbers using liquid helium and various gases", Journal of Fluid Mechanics, 2002, 461, 51-60).

Even though Estep et al. is silent about the pressure needed to pump the liquid; once the pumping is carried out, the pressure is obvious present. Furthermore, it is well known in the art that the pressure difference for pumping a liquid can be computed as taught by Swanson et al. By rearranging equation 2.1, one would easily obtain the same equation as claimed. One would be motivated to calculated the required pressure using this well known formula to ensure the pumpability of the liquid.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Estep et al. (US 3920424) in view of Paul (US4773483) as applied to claim 1 above, and further in view of Hawes et al. (US 20070193939).

Estep et al. does not explicitly teach the disposed sulfur could come from the purification treatment of hydrocarbons of nature gas. However, it is well known in the art that sulfur is removed during the purification treatment of hydrocarbons of nature gas as disclosed by Hawes et al. (section 0001). Since sulfur is harmful to humans, one of ordinary skill in the art would have been motivated to dispose the sulfur from the purification treatment.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Estep et al. (US 3920424) in view of Paul (US4773483) as applied to claim 1 above, and further in view of Winter et al. ("An Experimental Study on the Kinetics of the Formation and

Decomposition of Sulfanes in the Sulfur/H2S System", Ind. Eng. Chem. Res. 1996, 35, 1257-1262).

Estep et al. (US 3920424) in view of Paul (US4773483) does not specifically state the geological structures suitable for receiving the molten sulfur are those forming the reservoir from which the crude oil or natural gas containing sulfur are removed.

Winter et al. discloses sulfur present in the reservoir is transported by sour gas (natural gas containing sulfur) in the form of sulfanes resulting from a chemical reaction between sulfur and H2S (see introduction). It would be obvious to one of ordinary skill in the art that the reservoir formed from which the natural gas containing sulfur is removed is suitable to receive molten sulfur. One would be motivated to use it since it is naturally available and reduce industrial cost.

Conclusion

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to REBECCA LEE whose telephone number is (571)270-5856. The examiner can normally be reached on Monday-Friday 8:00 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 5712720579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. L./
Examiner, Art Unit 4181

/Vickie Kim/
Supervisory Patent Examiner, Art Unit 4181